

PATENT COOPERATION TREATY

REC'D 23 JUN 2005
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From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

4/8

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/IB2005/050259

International filing date (day/month/year)
22.01.2005

Priority date (day/month/year)
23.01.2004

International Patent Classification (IPC) or both national classification and IPC
H01L21/331

Applicant
KONINKLIJKE PHILIPS ELECTRONICS, N.V.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2005/050259

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2005/050259

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	3, 6, 10, 13, 16, 18
	No: Claims	1, 2, 4, 5, 7, 8, 9, 11, 12, 14, 15, 16, 17, 19, 20
Inventive step (IS)	Yes: Claims	
	No: Claims	1-20
Industrial applicability (IA)	Yes: Claims	1-20
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

Reference is made to the following documents:

- D1: US-A-5 506 427 (IMAI ET AL) 9 April 1996 (1996-04-09)
- D2: PATENT ABSTRACTS OF JAPAN vol. 014, no. 493 (E-0995), 26 October 1990 (1990-10-26) -& JP 02 203533 A (TOSHIBA CORP), 13 August 1990 (1990-08-13)
- D3: PATENT ABSTRACTS OF JAPAN vol. 014, no. 493 (E-0995), 26 October 1990 (1990-10-26) -& JP 02 205033 A (HITACHI LTD), 14 August 1990 (1990-08-14)
- D4: US-A-5 773 350 (HERBERT ET AL) 30 June 1998 (1998-06-30)

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 and 8 is not new in the sense of Article 33(2) PCT.

The document D1 discloses (the references in parentheses applying to this document):

a method for growing a mono-crystalline emitter for a bipolar transistor, comprising

- providing a trench (see fig 1f) formed on a silicon substrate having opposed silicon oxide sidewalls (34)
- selectively growing a highly doped monocrystalline layer (38) on the silicon substrate in the trench (see fig 1G)
- non-selectively growing a second silicon layer (40) over the trench in order to form an amorphous or polysilicon layer over the silicon sidewalls (see fig 1H).

The subject-matter of claims 1 and 8 is therefore not new (**Article 33(2) PCT**).

The method disclosed in D1 discloses a method from which the method of claim 15 apparently differs in that the growth method of the second layer 40 in the trench is not explicitly said to be "differential epitaxial growth".

The meaning of the expression "differential epitaxial growth" being not clear, it has been interpreted as in the description p5 lines 22-23 as a "non-selective growth mode". Therefore, since the deposition of layer 40 in D1 (figure 1H) appears to be non selective (layer 40 covers both the insulating layer 24 and the emitter layer 38), the growth mode can be considered as non-selective, thereby implicitly anticipating claim 15.

The subject-matter of claim **15** is therefore also new (**Article 33(2) PCT**).

It should be pointed out that the novelty of claims 1, 8 and 15 is also anticipated by D2 (see figure 4) and D3 (see abstract and figure 6).

Besides, claims 1, 8 and 15 lack inventivity over the method of D4, (see especially column 3 lines 46-52), which differs from the subject-matter of claims 1, 8 and 15 in that the single crystalline emitter first layer is not highly doped. According to circumstances, the skilled person would dope this layer as well-known in the art when trying to minimize the whole resistance of the electrode.

Dependent claims **2-7, 9-14** and **16-20** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step.

More specifically, claims 6, 13 and 18 referring to a further silicidation process cannot be considered as involving an inventive step because, as acknowledged in the description, page 6 line 14-16 is a well-known, commonly used technique to lower the resistance of an electrode and would therefore be applied by the skilled person according to circumstances without inventive skills.

Claims 3, 10 and 16 refer to the precursors routinely used in the art to grow silicon layers and do therefore not involve an inventive step.

All claims comply with Article 33(4) PCT regarding industrial applicability.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/IB2005/050259